Deckers Creek State of the Creek 2009

Executive Summary

Treatment of acid mine drainage (AMD) is making a difference in the Deckers Creek watershed; however, it is still the most harmful pollutant and there is more to be done to meet provisions of the Clean Water Act and improve watershed health. Since Friends of Deckers Creek (FODC) formed in 1995, water quality in the Deckers Creek watershed has improved. AMD projects constructed by FODC and its partners account for some, but not all of the improvement. Additional projects on the horizon should bring further improvements in the next few years. In 2006, FODC set a goal of "Fish by 2010 and Swim by 2015". Although challenging, FODC believed that with hard work and strong partnerships, Deckers Creek could be fishable from its mouth to its headwaters by 2010. Now, in 2010, fish communities in some parts of the watershed are much more robust. Unfortunately, Deckers Creek through Morgantown remains an eyesore barely able to support aquatic life due to AMD from the Richard mine. And 2009 data indicate there still are pollution issues beyond the Richard mine to monitor and address. Data collected on macroinvertebrate communities in the watershed indicate that water quality is indeed improving in the mainstem of Deckers Creek; however, sites below the Richard Mine remain impaired, and impaired communities were also found in several main tributaries. The Deckers Creek Restoration Team continues to implement a watershed based plan to address AMD throughout the watershed. The Team is also monitoring fecal coliform and sediment inputs and has plans to begin a stream bank restoration project on Aaron's Creek.

The Watershed

The Deckers Creek watershed is 64 square miles in Monongalia and Preston Counties and includes Deckers Creek itself and all of its smaller feeder streams or tributaries. Deckers Creek starts as a small brook on Chestnut Ridge near the Kingwood Pike in Monongalia County. It flows through the Valley District of Preston County to Masontown, where it turns northwest and cuts a gap back through Chestnut Ridge. After passing down through the steep and scenic gorge it has cut in the ridge, it flows through Morgantown to the Monongahela River.

Land Use

Outside of Morgantown, land use in the Deckers Creek watershed is predominately forest and agriculture intermixed with a few small towns. The watershed includes most of the Valley District in Preston County, including Arthurdale, Reedsville and Masontown, and most of Morgan District in Monongalia County, including the unincorporated areas of Sturgisson, Brookhaven, Dellslow, Richard, and a substantial part of the City of Morgantown, especially the Sabraton area. Sabraton is heavily urbanized with large areas of impervious surfaces and stormwater management issues which lead to flooding problems (Fig 1).

Geology

The Upper Freeport Coal is found throughout the watershed except where it has eroded from the heights of the Chestnut Ridge anticline and where a few of the major tributaries have eroded it away (Fig. 2). The Pittsburgh seam occurs in a small amount in the watershed and only near Morgantown (Fig. 2). The oldest rock with substantial exposure is the Greenbrier Limestone, which is found and mined where the creek cuts through the center of the Chestnut Ridge anticline at Greer Limestone (Fig. 3). The Bakerstown Coal is found between the Upper Freeport and Pittsburgh seams and was mined in the Preston County portion of the watershed (Fig. 2).

Fig. 1. 1992 Land Use in the Deckers Creek Watershed and Surrounding Area

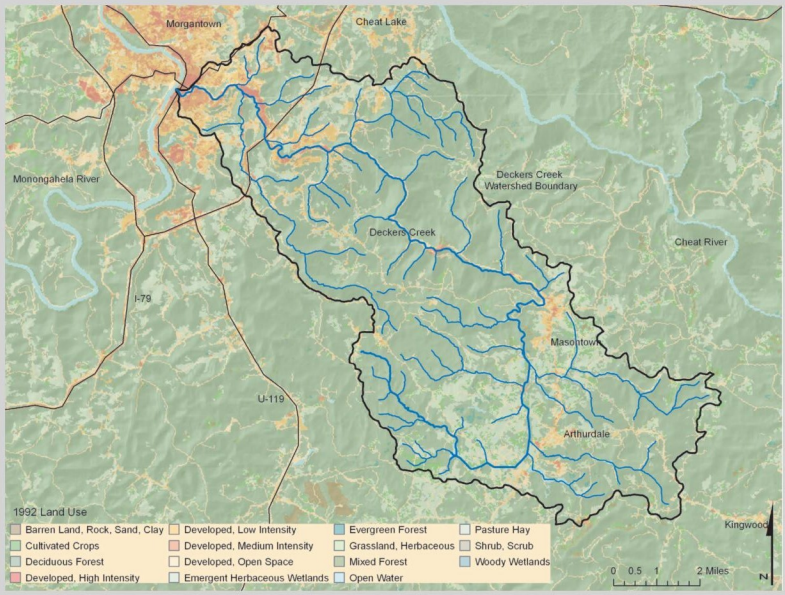
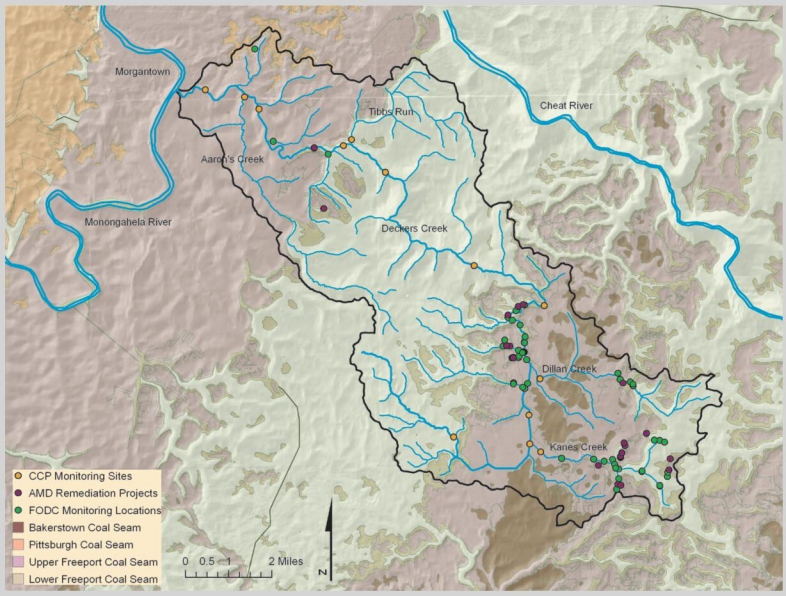


Fig. 2. Coal Seams in the Deckers Creek Watershed and Surrounding Area with Locations of Monitoring Sites and Acid Mine Drainage Remediation Projects



The Watershed, continued from page 1

Pollution

Coal and pyrite, a mineral associated with the coal, are responsible for the most devasting pollution in Deckers Creek: acid mine drainage (AMD) from abandoned coal mine operations. Mining coal exposes pyrite (iron and sulfur) to oxygen and water. Oxygen reacts with sulfur to form sulfuric acid which brings dissolved iron and aluminum into the water. AMD is detrimental to aquatic life because of both its acidity and dissolved metals. Deckers Creek is also polluted by bacteria from untreated sewage, sediment, trash, and general abandonment.

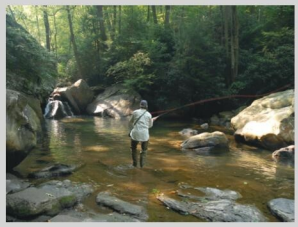
Restoration

However, restoration of the creek is attainable and crucial for the course its communities want to take. The watershed's largest city, Morgantown, lies at Deckers Creek's confluence with the Monongahela River. River-focused development and a very popular rail-trail that parallels Deckers Creek have made remediation of Deckers Creek essential. The local Convention and Visitors Bureau promotes the city as a hub for outdoor recreation and nature-based tourism. Local residents walk, bike, and rollerblade on the rail-trail for exercise and to commute to work.

While Deckers Creek was once used as a waste disposal system, it is now emerging as a centerpiece of future economic development. A clean creek and revived fishery mean restored habitat, increases in property values, greater tax revenues for local governments, and new options for innovative creek-side development. In order to make improvements in the watershed, FODC needs reliable information about the current condition of the creek. We collect and compile this information through the Clean Creek Program.







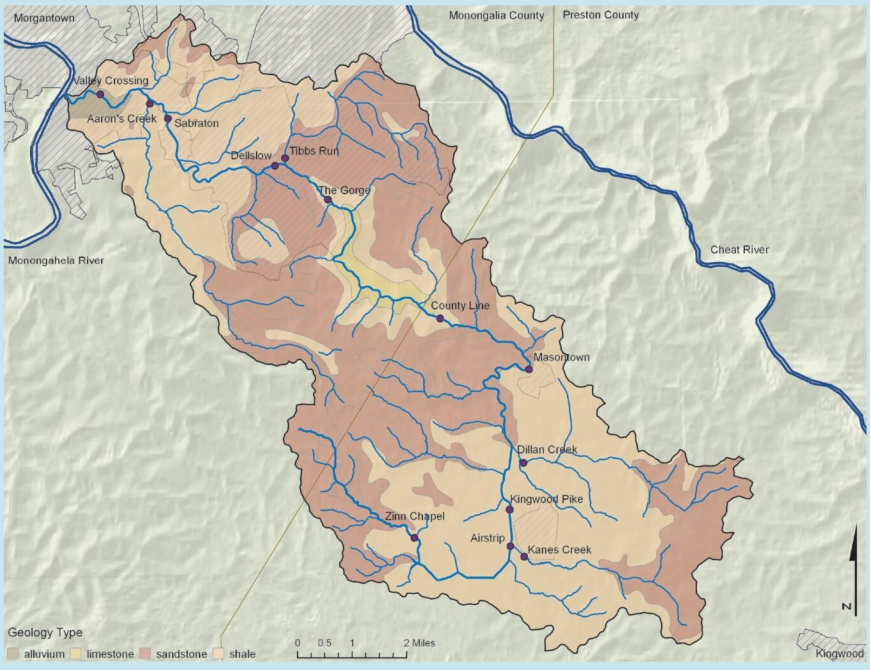
The Clean Creek Program

Founded in 2002, the purpose of the Clean Creek Program (CCP) is to monitor and track long-term trends in the water quality and biological communities of streams in the Deckers Creek watershed and to disseminate these findings to the general public. Data collected and published through this program are used to steer restoration efforts, to evaluate restoration success, and to educate community members, leaders and students on the steps being made to improve current conditions and to protect Deckers Creek in the future.

Table 1. CCP Monitoring Sites and 2009 Site Sponsors

Mainstem Sites	Distance from Mouth	Site Sponsor
Valley Crossing	1	Dominion Foundation
Sabraton	3	Walmart Charitable Giving
Dellslow	6	Eric Henrickson
Gorge	7	Heather Christiansen, LLC Birth to Three Provider
County Line	11	Mylan Pharmaceuticals
Masontown	13	WesBanco
Kingwood Pike	17	Adventure's Edge
Airstrip	18	Atkinson Family
Zinn Chapel	20	Tronco Family
Major Tributaries		
Aarons Creek	3	Norcross Wildlife Foundation
Tibbs Run	6	Monongalia County Solid Waste Authority
Dillan Creek	15	USA EPA Environmental Education Program
Kanes Creek	18	WVU National Research Center for Coal and Energy

Fig. 3. Geology of the Deckers Creek Watershed and Clean Creek Program Monitoring Locations



Sites

For the CCP, we monitor water chemistry and biological communities at 13 sites throughout the watershed including nine locations in Deckers Creek and four in major tributaries (Fig. 3 and Table 1). These sites were chosen according to several criteria. They document changes in the creek up- and downstream from sources that impact water quality. Second, sites where people encounter the creek, especially on the Deckers Creek Rail-Trail, were given higher priority. Finally, major tributary sites were chosen based on their potential for holding fish during low flow in the mainstem, as well as for their effects on the mainstem.




Methods

Water chemistry is measured at each site four times annually. Water quality parameters collected in the field include pH, temperature, conductivity, flow, and dissolved oxygen. We also take samples to the WVU National Center for Coal and Energy for further analysis of metals and fecal coliform bacteria. FODC assesses fish communities in the fall in collaboration with the West Virginia University Wildlife and Fisheries Department. Fish are collected using a backpack electrofisher, identified by species, weighed, measured, and returned near their point of capture. Invertebrate communities are assessed in the spring using kick nets and are sorted, identified to the family level, and counted. This invertebrate data are then used to calculate West Virginia stream condition index scores for each site.

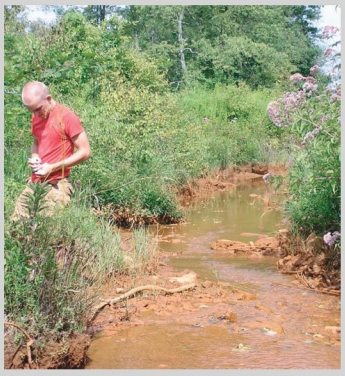
Results

Water Chemistry

AMD remediation projects are improving water chemistry in Deckers Creek. Over the past 6 years, average pH in the Deckers Creek mainstem has increased from 6.28 to 7.04 (Fig. 4). Streams with pH values below 6 indicate that the water may be too acidic to support rich aquatic life.

There is a small amount of AMD in the uppermost segment of the creek, a large impact from AMD in Kanes Creek, several smaller sources of AMD through Masontown indicated by increased levels of iron at mile 13, and then improved water quality as Deckers flows through a region of limestone bedrock (mile 6) (Fig. 5).

The Richard mine continues to devastate water quality with increased acidity (reduced pH) and high metal concentrations (aluminum, iron, and manganese) in Deckers Creek through Morgantown (Fig. 5). Iron concentrations higher than 1.5 mg/L do not meet WV water quality standards.




Several sites in the mainstem of Deckers Creek are impaired by untreated sewage causing dangerous concentrations of fecal coliform bacteria (above 400 cfu/100 mL) and because we do not regularly sample during high flow events, we are not capturing the greatest concentrations of bacteria at these sites (Fig. 6). Further, average fecal coliform concentrations in the Deckers Creek mainstem have almost quadrupled from 2003 to 2009 (Fig. 6 Insert). Bacteria in Deckers Creek may come from homes and businesses with inadequate sewage treatment systems, combined sewer overflows during rainy periods, or wildlife and livestock. FODC plans to intensify its fecal coliform bacteria monitoring program over the next few years.

Fig. 4 - Average pH in Deckers Creek from 2003 to 2009

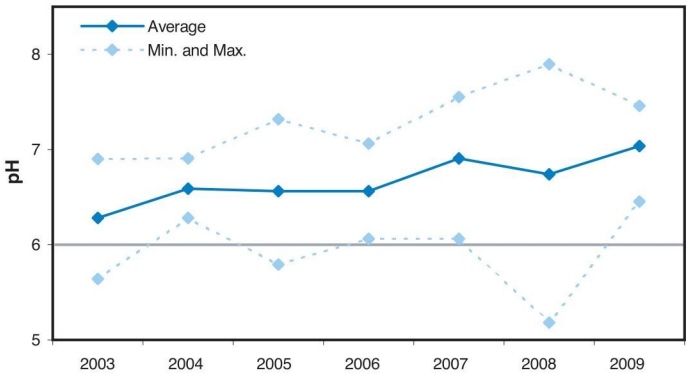


Fig. 5 - Total Iron in Deckers Creek in 2009

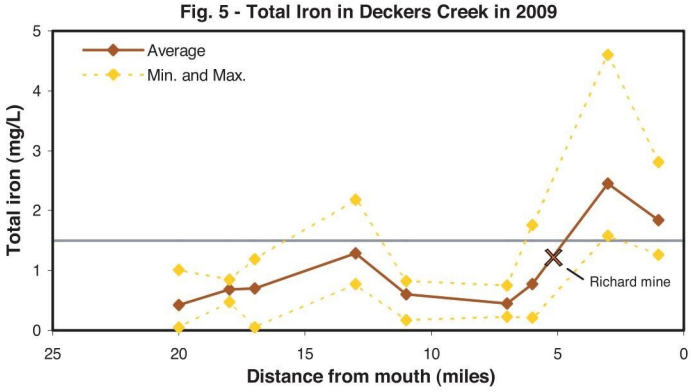
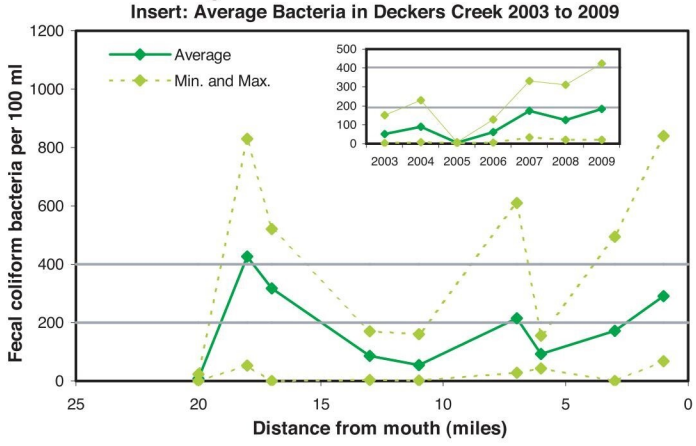


Fig. 6 - Bacteria in Deckers Creek in 2009
Insert: Average Bacteria in Deckers Creek 2003 to 2009



Kanes Creek is the only major tributary monitored through the CCP severely impacted by AMD indicated by low pH values and high iron concentrations (Fig. 7). However, the other three major tributaries sampled through the CCP are impaired by high fecal coliform bacteria concentrations (Fig. 8), nutrients, and possibly excess sediments.

Fig. 7 - pH and Iron in the Major Tributaries in 2009

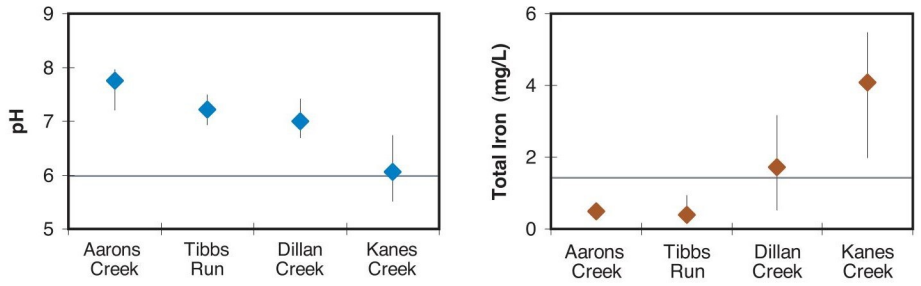
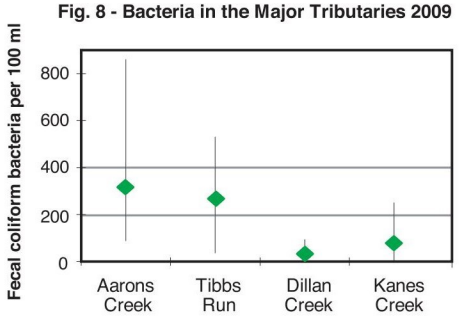


Fig. 8 - Bacteria in the Major Tributaries 2009



Fish

Deckers Creek has a lot of outdoor recreational opportunities, but even more potential, including Class V kayaking through the steep and scenic gorge, swimming, and fishing. In fact, rumors have it that Deckers Creek used to support native brook trout. However, years of coal mining, timbering, farming, and development have left their toll on the fish communities now found here. As the watershed recovers, fish populations are slowly recovering in Deckers Creek. On average, fish communities were better across the watershed in 2009 compared to 2002-2004, but not as good as those found more recently from 2006 to 2008 (Figs. 9 and 10). Common fish found in Deckers Creek and its tributaries include creek chubs, white suckers, green sunfish, yellow bullhead catfish, bluegill, and smallmouth bass. Other less common species found over the past few years include rock bass, pumpkinseed sunfish, chain pickerel, sauger and other minnows and darters. The most abundant fish found in 2009 were creek chubs, blacknose dace, green sunfish, white suckers and yellow bullhead.

Fig. 9 - Number of Fish Species in Deckers Creek in 2009
Insert: Average Trend from 2003 to 2009

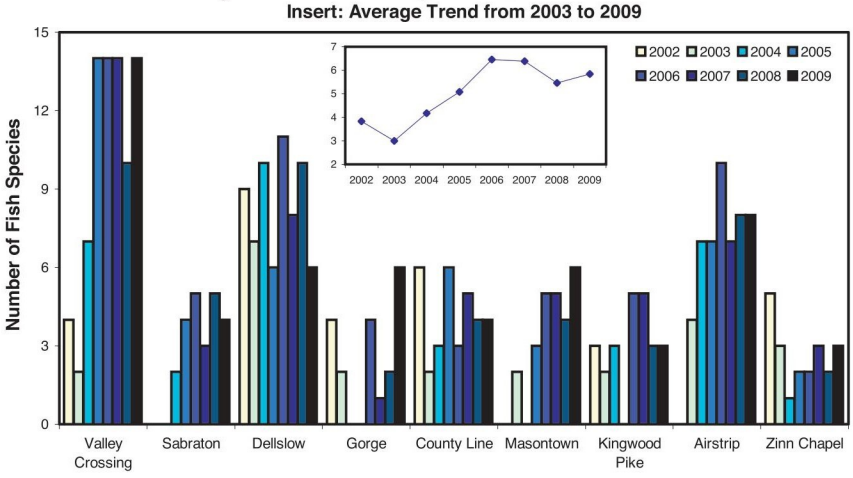
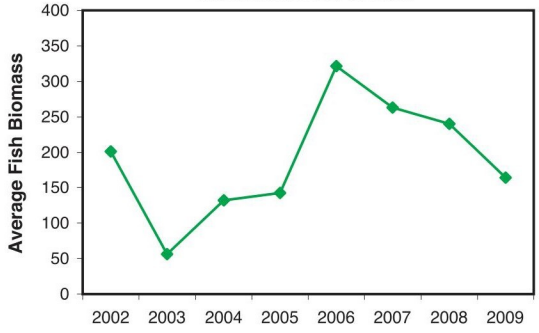


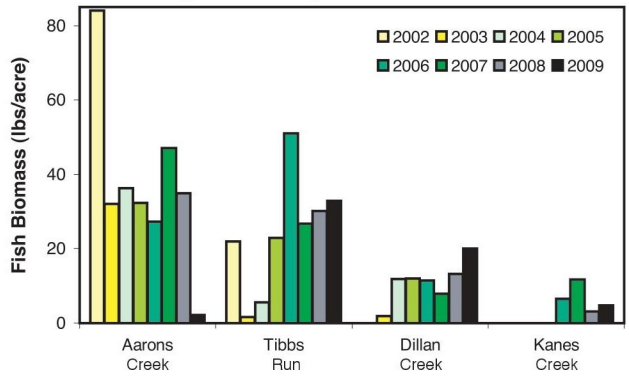
Fig. 10 - Average Fish Biomass in Deckers Creek from 2003 to 2009



The fish community at Valley Crossing is the most diverse in the watershed due to its proximity to the Monongahela River (Fig. 9); however, benthic macroinvertebrate communities here indicate poor water quality likely due to pollution from the Richard mine, elevated bacteria levels, sediment, and nutrients. Due to the Richard mine, fish communities in Sabraton remain severely degraded. Just above the Richard mine, fish populations thrive; however, the community in 2009 at Dellslow was reduced indicating variable water chemistry. We still found several large bass, white suckers, and green sunfish at this site making it one of the best spots to fish and a hopeful picture of what Deckers Creek could be through Morgantown (Fig. 9). Fish populations in Deckers Creek through Masontown continue to improve likely due to the new wastewater treatment facility there and completed AMD treatment projects (Fig. 9). Deckers Creek near the old Reedsville airstrip remains a decent fishing spot with good-sized spotted or smallmouth bass, green or bluegill sunfish, and catfish (Fig. 9).

Aarons Creek typically supports a very robust fish community; however, this year, we found extremely large reductions in the populations (Fig. 11). The amount of sediment entering Aarons from development and agricultural practices may be impacting fish communities in this stream and will be monitored closely in the future. Fish populations in Tibbs Run remained similar to recent years, populations in Dillan Creek improved, and those in Kanes Creek declined (Fig. 11). Water quality in Kanes Creek has improved in recent years with fish found in 2007 in relatively high numbers. Since 2007, however, fish have not been as prolific, but include a few sunfish, and creek chubs.

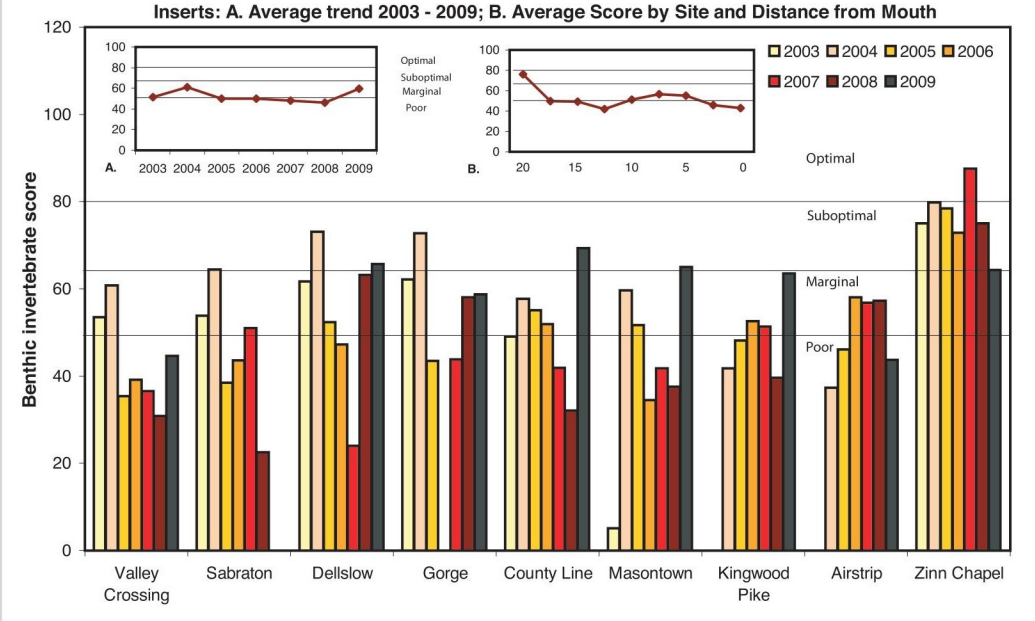
Fig. 11 - Tributary Fish Biomass in 2009



Benthic Macroinvertebrates

Aquatic benthic macroinvertebrates, or "stream bugs", are small creatures that you can see with your eye, have no backbone, and live in the sediments at the bottom of waterways. The number and variety of macroinvertebrates found in a creek or river are consistent and good indicators of a stream's health. If a stream supports many different types of bugs in large quantities, it indicates good water quality while polluted streams have fewer types of macroinvertebrates usually dominated by one or two types. On average, benthic macroinvertebrate communities in the mainstem of Deckers Creek improved slightly in 2009 compared to recent years (Fig. 12 Insert A), but have yet to reach sub- or optimal levels.

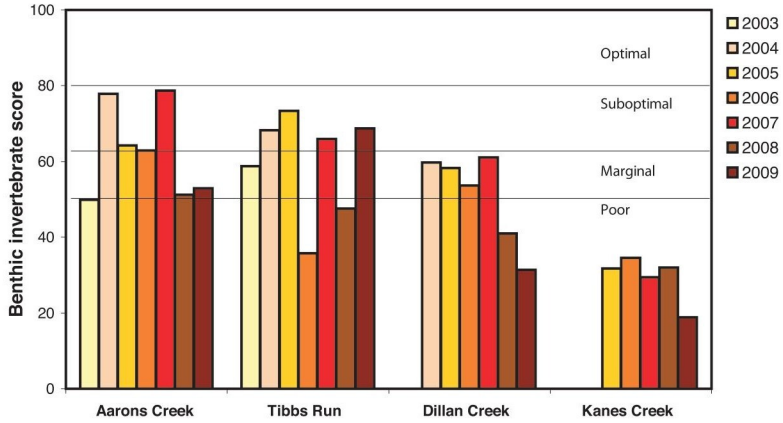
Fig. 12 - WV Stream Condition Index Scores for Macroinvertebrates in Deckers Creek
Inserts: A. Average trend 2003 - 2009; B. Average Score by Site and Distance from Mouth

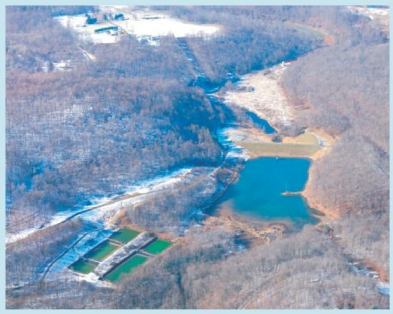


Macroinvertebrate communities typically follow water quality patterns, with the best scores found in the headwaters of Deckers Creek (Fig. 12 Insert B) and reduced scores through the Valley District of Preston County. However, macroinvertebrates in Deckers Creek at Masontown did improve greatly in 2009 (Fig. 12). Macroinvertebrate scores then improve through the Gorge and remain depressed through Morgantown indicating poor water quality due to pollution from the Richard mine (Fig. 12).

Macroinvertebrate communities indicate poor water quality in Kanes Creek and worsening water quality in both Dillan Creek and Aarons Creek (Fig. 13). Quite variable, macroinvertebrate communities in Tibbs Run have fluctuated from poor to suboptimal from 2003 to 2009 (Fig. 12).

Fig. 13 - West Virginia Stream Condition Index Scores for Macroinvertebrates





Remediation

Since FODC formed in 1995, water quality in the Deckers Creek watershed has improved. AMD projects constructed by FODC and its partners account for some but not all of the improvement and additional projects on the horizon should bring further improvements in the next few years.

The improvement in water quality in Morgantown is striking now, even before a necessary treatment facility for the Richard mine is built. In the 1990s, Deckers Creek below Richard would occasionally hit a pH near 4. Since 2000, we have seen few pH results less than 6. We took a step closer to a solution for the Richard mine in the last year, when WVDEP agreed to fund 80% of 20 years worth of operations and maintenance (O&M) and the City of Morgantown and the Monongalia County Commission agreed to partner as the sponsoring local organization for a treatment facility. FODC is currently partnering with the NRCS who will fund the design and building of the facility, WVDEP, the City of Morgantown, and the Monongalia County Commission to solve this problem.

Kanes Creek has also improved, and Deckers Creek upstream from the Gorge has improved as a result. The Morgan Mine treatment plant is the AMD treatment giant in the Kanes Creek sub-watershed. International Coal Group (ICG) is required by law to treat the discharge from these mines that have been closed since the 1990's and ICG personnel estimate that they are treating more than 400 tons of acidity per year.

Upstream from the Morgan Mine Treatment plant, Kanes Creek is almost as acidic as it was in 1995. FODC targeted 11 AMD sources in this area in its 2005 watershed based plan. The Valley Point #12 project, completed in 2008, has eliminated approximately ten tons of acidity per year. Two projects to be completed this spring including the Kanes Creek South Site #1 and Valley High Wall #3 will eliminate an additional 19 tons. Future projects are being developed to eliminate the remaining eight sources of AMD, which contribute an additional 27 tons. At that point, the acidity will have been eliminated from a flood control impoundment near the end of the Deckers Creek Rail-Trail, and we hope that it becomes a fishing destination for community members. Slabcamp Run has been the second major focus of our Valley District AMD remediation efforts. WVDEP and FODC have both completed projects here but there are still acid loads to address. We have increased our monitoring, identified four sources of AMD, and have proposed a treatment project to the WVDEP. Meanwhile, we are trying to decrease the intensity of the AMD with regular additions of limestone sand funded by the NiSource Environmental Challenge Fund.

Our AMD remediation work depends greatly on partnerships. The Nonpoint Source Pollution Program in WVDEP is the major funding source, followed by the US Office of Surface Mining. The WVDEP Office of Abandoned Mine Lands and Reclamation is also providing operations and maintenance funding for two of our projects. Further, the NRCS has completed several AMD remediation projects in the Deckers Creek watershed. All of the AMD remediation project and monitoring locations in the Deckers Creek watershed can be seen in Fig. 2. Each project takes several years of work establishing partnerships with landowners, securing funds, designing treatments schemes, and finally moving earth. But the AMD in the creek is slowly being eliminated source by source.

Sponsors

The 2009 and 2010 CCP is funded largely in part by the US EPA Environmental Education program. Other granting organizations for the 2009 CCP include the WVDEP Nonpoint Source program, Dominion Foundation, Norcross Wildlife Foundation, and Walmart Charitable Giving. The CCP is also made possible by local site sponsors at the $300 level including businesses, organizations, families, and individuals (Table 1). Volunteers from the FODC Youth Advisory Board, WVU student interns, and numerous other adult and youth volunteers also keep the CCP going. **Thank you all for making this program possible!**

If you are interested in sponsoring or volunteering for the Clean Creek Program, please contact us, we would love to hear from you!

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